



NDCEE

National Defense Center for Energy and Environment

Landscape Modeling Technologies for Sustainable Forests

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DoD Executive Agent

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of the Army
(Installations and
Environment)

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Presentation Highlights

- Demonstration Goals and Objectives
- Modeling Tool
- Sustainable Forests Concern
- Demonstration Findings

Background



- Better forestry/fire management tools are needed to facilitate sustainable land management, planning, policymaking, and education at military installations

Courtesy of National Interagency Fire Center

Demonstration Goal

- Evaluate a forest management tool on its ability to help a military installation meet four forestry objectives:
 1. Fire-hazard mitigation through reductions of surplus stems (fuel loads) to protect personnel and facilities
 2. Sustainable habitat to maintain options that better withstand the impacts of natural disturbances such as wind, fire, and pest infestation
 3. Landscape diversity that will contribute to the diversity of training conditions while protecting installations
 4. Age-class diversity to promote a healthy forest by ensuring a good distribution of tree sizes, ages, and structural conditions

Demonstration Objectives

- Determine how the impact of wildfire intensity will change through time, subject to no management or treatment to reduce hazardous fuel loads
- Determine if the tool supports tradeoff analyses
- Perform a cost-benefit analysis to identify the tool's implementation costs and resulting vegetative treatment costs that have a positive payback for the facility

Landscape Management System (LMS)

- Integrates 20+ growth, treatment, spatial, and visualization models into a single, user-friendly software application package
- Can simulate a variety of vegetative treatments and forecast expected changes through time across landscapes



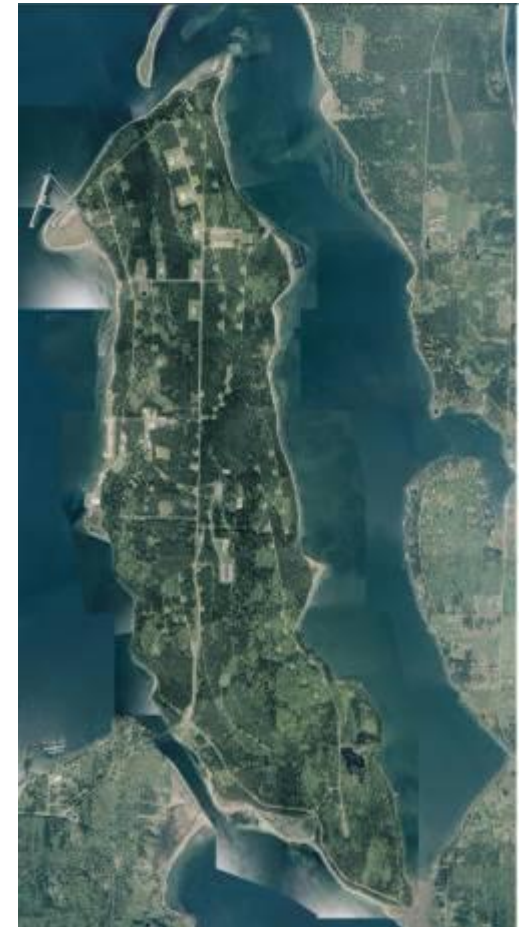
To reduce soil disturbance, Navy foresters may use horses instead of vehicles to move logs during tree thinning.

LMS (continued)

- Can be used for fire hazard, timber yield, carbon sequestration, and wind risk analyses as well as visual impact analysis of targeted view sheds
- Developed under a partnership among the University of Washington, Yale University, and the USDA Forest Service
 - Maintained and updated by Rural Technology Initiative, a research and technology transfer consortium between the University of Washington and Washington State University
- Publicly available at: <http://lms.cfr.washington.edu>

NAVMAG Indian Island – Case Study

- Located in Puget Sound, the island is the ordnance management center for fleet and shore stations in the Pacific Northwest Region.
- Operates the deepest ordnance port in the Northwest and supports all of the Services
- Hosts 3 to 4 annual joint training activities to ensure military readiness
 - Depending on the exercise, Army, Coast Guard, Marines, and Canadian forces may participate.
 - Up to 1,200 people may participate in an exercise.



NAVMAG Indian Island

NAVMAG Indian Island – Case Study

- 2,716 acres, with 2,200 acres (80%) forested
- Specific land management objectives include:
 - Force protection of personnel and facilities
 - Mission-readiness support
 - Natural resources enhancement
 - Cultural resources protection

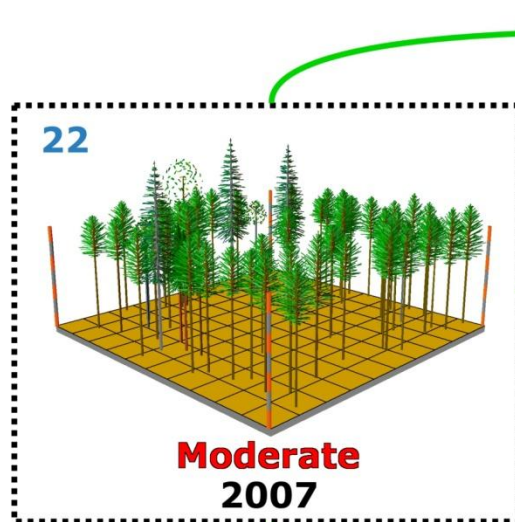


Mission-readiness support

Accomplishments and Results

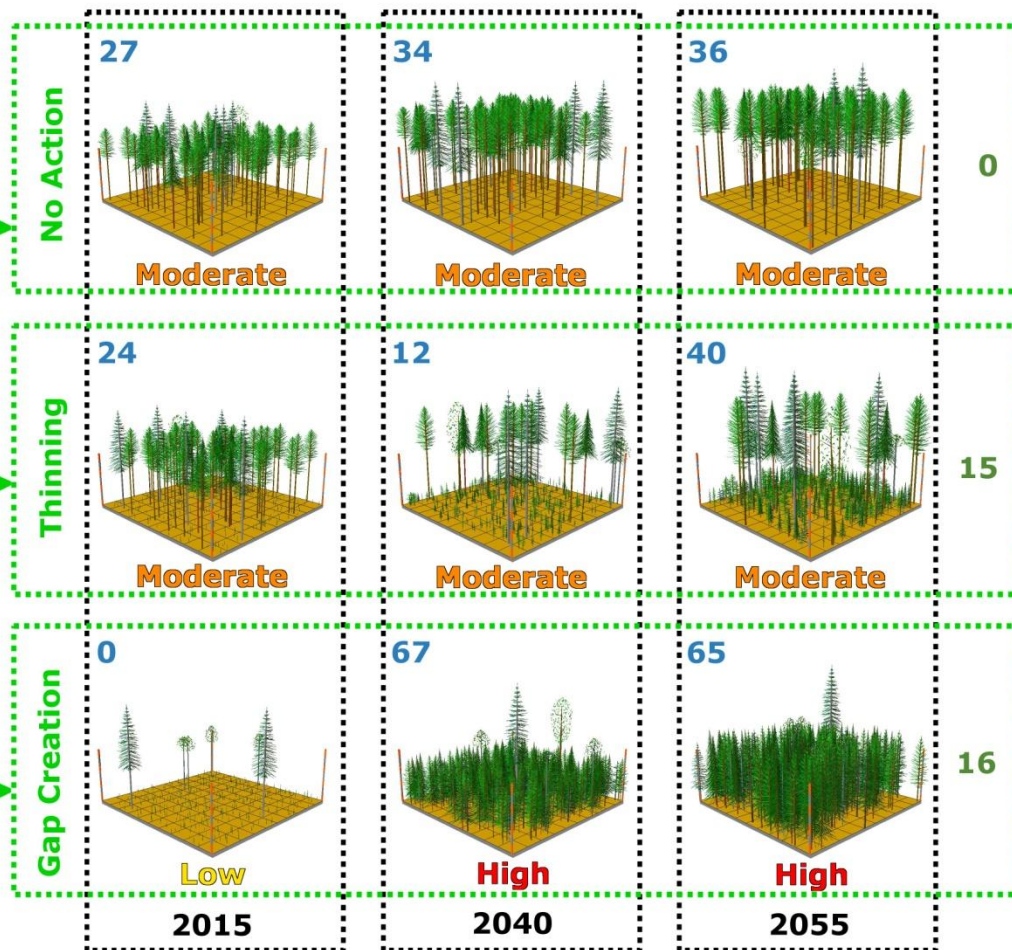
- Demonstrated how combining forestry management models and data can help DoD land managers to meet management objectives
 - Conducted scenarios to determine the best means for treating a select area as part of an integrated facility management plan
- Conducted a cost-benefit analysis that showed potential cost avoidance ranging from \$1,500 per acre to over \$8,000 per acre
 - Included avoidance of timber and facility losses, potential fatalities, fire suppression and regeneration costs
 - Including firefighting injury avoidance increases the net benefit to over \$1.6 million per acre

The Landscape Management System compares treatment regimes by using multiple outputs to inform decision makers and avoid unintended consequences



Legend:
 Simulation Year **Year**
 Treatment Regime **Regime Name**
 Total Harvest Volume **MBF / acre**
 Woodpecker Habitat **Suitability 0 - 100**
 Fire Hazard **Low Moderate High**

(See Credits / Information for Fire Hazard and Woodpecker Habitat definitions)



Credits / Information:
 Treatment regimes and stand selection provided by Terri Jones and Walter Briggs, Naval Facilities Northwest
 Treatment simulations done using the Landscape Management System v. 2.0.45 (LMS: lms.cfr.washington.edu)
 Growth engine for LMS is the Forest Vegetation Simulator Pacific Northwest Coast variant (FVS-PN: www.fs.fed.us/fmnc/fvs)
 Fire hazard based on Crowning Index (CI) estimated using the Fire and Fuels Extension for FVS (FFE-FVS).
 Fire hazard classifications are: High = CI <= 25, Moderate = 25 < CI <= 50, Low = CI > 50
 Woodpecker habitat suitability is on a scale from 0 (unsuitable) to 100 (optimal) for hairy woodpecker:
 Sousa, P. J. 1987. Habitat suitability index models: hairy woodpecker. U.S. Fish Wildl. Serv. Biol. Rep. 82(10.146). 19pp.
 Stand visualizations created with the Stand Visualization System (SVS: forsys.cfr.washington.edu/svs.html)
 Image created by Kevin Ceder, University of Washington, Seattle, using the GIMP (www.gimp.org)

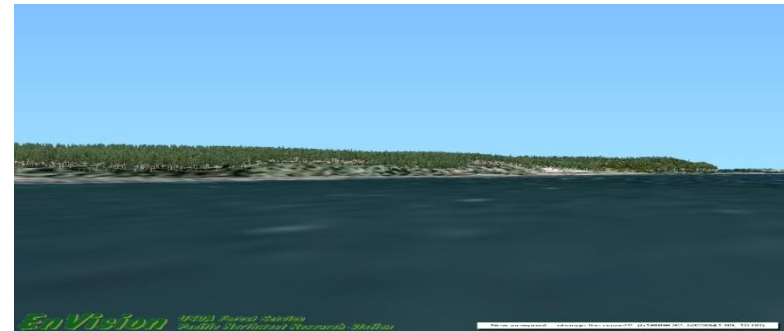
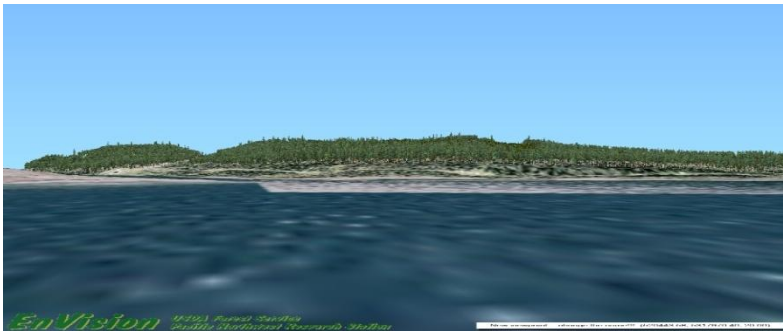
Landscape Images



Inside a forest



From main road



From the water

Accomplishments and Results

- Provided a 3-day DoD-customized LMS training seminar to Pacific Northwest Service personnel who conduct sustainable land management practices
 - Discussed how to use the LMS tool as a communication vehicle for tradeoff analysis
 - Identified potential teaming opportunities to obtain inventory data
 - Shared natural resource best practices and lessons learned

LMS Workshop



Touring NAVMAG Indian Island to observe conditions of specific forest stands



Learning how to apply the LMS tool to help manage NAVMAG Indian Island's forest

LMS Benefits

- Supports tradeoff analyses and prioritizing activities
- Provides a framework to prepare in-depth fire management plans from multiple perspectives and adds value to Integrated Natural Resource Management Plans (INRMPs)
- Helps minimize impacts from wildfires (and prescribed burns, if allowed at site)
- Helps land managers to maintain healthy forests over the long term
- Improves installations' ability to manage natural resources to meet mission objectives

Summary

- The demonstration created a unique adaptation and integration of LMS modeling and simulation components and applied it to a Navy forest.
 - Modeling tools such as LMS make forest complexity manageable, predictable, and cost-effective.
 - They also offer educational benefits by promoting and explaining management decisions and their anticipated results.

Modeling tools can help decision makers to manage the forest as an installation asset that supports mission-oriented achievements.

Summary (continued)

- The Navy and Fort Lewis are building upon the NDCEE demonstration project to further deploy LMS for numerous resource projects.
 - Navy is applying the tool to NAVMAG Indian Island.
 - Navy and Fort Lewis plan to collect inventory data for incorporation into LMS.

Federal building on fire



Project Stakeholders

- Command Navy Region Northwest
- NAVMAG Indian Island
- Naval Facilities Northwest
- Fort Lewis
- Engineer Research and Development Center-Construction Engineering Research Laboratory (ERDC-CERL)
- Rural Technology Initiative (RTI)

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